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FIGURE 2 - DETAILED SITE MAP W/ SAMPLE LOCATIONS



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Sauget Area 2, O & S

Public Comment Release

Public Health Assessment

Sauget Area 2 Landfill

Site O and Landfill S

Sauget, St. Clair County, Illinois

EPA Facility ID # ILD000672329

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Prepared by

Illinois Department of Public Health  
under cooperative agreement with the  
Agency for Toxic Substances and Disease Registry

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## **Summary**

Sauget Area 2 is a proposed National Priorities List site. As a result, the Illinois Department of Public Health (IDPH) has prepared this public health assessment, which evaluates Site O, the Sauget Waste Water Treatment Plant and its lagoons, and Landfill S, which is adjacent to Site O.

The source of contamination at these sites includes industrial sludge in the lagoons on Site O, underground storage tanks used to store waste oil, dioxins, and polychlorinated biphenyls (PCBs) in surface soil near these tanks, and landfilled chlorinated solvent wastes, which are coming to the surface and affecting surface soil at Landfill S. The chemicals of interest from the surface soils at Landfill S include 1,1-dichloroethane, 1,1,1-trichloroethane, vinyl chloride, and mercury.

Since this is an active industrial area, exposure to these chemicals is expected to occur for adults only. Most of the areas of contamination are fenced and are located across a four-lane highway from the nearest residential area. Exposure dose estimates for on-site workers found no apparent increased cancer risk or other health hazards due to exposure to on-site contamination. IDPH concludes that Site O and Landfill S pose no apparent public health hazard. IDPH recommends that workers at Landfill S limit or avoid contact with any on-site waste material.

## **Purpose and Health Issues**

The Sauget Area 2 site was proposed for addition to the National Priorities List on September 13, 2001. Area 2 consists of Site O, and landfills P, Q, R, and S. In this public health assessment, IDPH will examine whether exposure to contaminants at Site O and Landfill S has occurred in the past, is occurring, or might occur in the future. Because exposure issues are different there, Landfills P, Q, and R will be addressed in a separate public health assessment.

Since the site is in an industrial area, with the nearest homes 0.5 miles east across a four-lane highway, the main population of interest is the employees of the nearby industries. Employees of the American Bottoms Regional Waste Water Treatment (ABRWWT) plant are currently most likely to be exposed to site-related contaminants, particularly from Landfill S. Past and future exposures might occur in workers sampling or monitoring the sites and excavating or otherwise disturbing the contaminated areas.

## **Background**

### **Location and History**

Sauget is in St. Clair County, Illinois, south of East St. Louis and across the Mississippi River from St. Louis, Missouri. Sauget is surrounded by several large industries and has many areas of contamination. These contaminated areas are collectively known as the Sauget Sites. The Sauget

Sites are divided into two areas, Area 1 and Area 2. The dividing line for Areas 1 and 2 is Illinois Route 3, with the sites east of Route 3 belonging to Area 1 and those to the west in Area 2. This public health assessment evaluates Site O and Landfill S, in Area 2 (Figure 1).

### Site O

Site O is near Mobile Avenue in Sauget. About 45 acres in size, the site includes the Sauget Waste Water Treatment Plant (SWWTP) and its four lagoons (1). SWWTP was a primary treating facility releasing its effluent to the Mississippi River. SWWTP has a laboratory that is still in use, but the lagoons are closed (2). Figure 2 shows the site features of Site O.

SWWTP is in the northern section of the site. The four inactive sludge dewatering lagoons are in the southern portion. The unlined lagoons were used for disposal of clarified sludge from 1965 to the late 1970s (1). These former sludge lagoons cover about 20 acres and have been capped with clay and vegetated. No waste is evident on the surface. Two areas of contamination are west of SWWTP. Another contaminated area is inside the fence just south of the buildings at SWWTP (1). The site has chain-link fencing surrounding most of it, but vehicles are not restricted on the access road.

The history of Site O includes activities at SWWTP, which began operation in the early 1950s. The plant treats wastewater from area industries and the residents of Sauget. About 10 million gallons of wastewater per day are treated at the facility. More than 95 % of the wastewater is from area industries, including Solutia (previously Monsanto), Cerro Copper, and Big River Zinc. Effluent from the plant is permitted to discharge to the Mississippi River under a National Pollutant Discharge Elimination System (NPDES) permit.

The treatment plant has had many past violations of the NPDES permit. These violations are primarily due to the chemical quality of the plant effluent (1). Mercury, polychlorinated biphenyls (PCBs), and organic solvents have been detected at levels that violated the permit limits on several occasions. A 1982 U.S. Environmental Protection Agency (USEPA) study concluded that the effluent from the wastewater treatment plant annually contributed a substantial volume of toxic pollutants to the Mississippi River.

Site O is adjacent to Clayton Chemical, which reclaimed used solvents. A section of Clayton Chemical was leased for waste oil storage. This waste oil was contaminated with dioxins. The Illinois Environmental Protection Agency (Illinois EPA) found a ruptured underground storage tank on the property. The storage tank, contaminated wastes, and contaminated soils were removed from the Clayton Chemical property in 1983.

In 1984, there was an attempt to install a water line and sewer lines to the new treatment plant through the lagoons. Wastes were encountered while trenching. The trench was filled and the waterline was subsequently installed above the ground (1).

**Landfill S**

Landfill S was identified from aerial photographs as a drum disposal area in the early 1970s. It is located just west and north of the American Bottoms Regional Waste Water Treatment (ABRWWT) plant. ABRWWT, a secondary and tertiary treatment facility, began operation in 1986. Although the wastes were land-filled, surface leachate seeps are visible in the southern portion of the site.

Access to two areas of Landfill S is restricted by fences with locked gates. The surface leachate seeps are within a fenced area in the southwestern portion. This area is covered with gravel. No plant activities are being carried out in these areas; however, the southwestern graveled portion of the site is sometimes used for parking. Grass cutting and herbicide application has been contracted out for both of the fenced areas of Landfill S (2).

**Demographics and Land Use**

The population within a 1-mile radius of Area 2 is about 815 persons and includes all of Sauget, and small portions of East St. Louis and Cahokia. The nearest home is approximately 0.5 miles southeast of the site. Nearby businesses include ABRWWT, SWWTP, Trade Waste Incinerator, Phillips Petroleum, Cerro Copper, and Solutia. The estimated number of workers within 0.25 miles of the site is 100.

Land use near Site O and Landfill S is industrial. Landfills and land disposal areas are the dominant land use west of Route 3 between Monsanto Avenue and Cargill Road. The nearest downgradient well that could be used for drinking water is located at the Cargill facility more than 1 mile from Site O (Paul Takacs, Illinois EPA, personal communication, June 2001). Cropland is south of Area 2. The nearest residential areas are east of Illinois Route 3 in Sauget and Cahokia (Figure 1).

**Environmental Sampling at Site O**

In February and March 1983, 33 soil samples were collected in the area south of the SWWTP buildings and north of Mobile Avenue. The location of these samples is shown in Figure 2. The samples, collected from surface and subsurface soils, were analyzed for PCBs and dioxins (1). At Site O, subsurface samples were collected from depths of more than 1 foot below the surface and as deep as 25 feet in some locations. Surface soil samples were collected to a depth of 6 inches.

In February 1983, Illinois EPA was informed of a leaking underground storage tank on Clayton Chemical property. Illinois EPA found the tank and conducted sampling. The storage tank, contaminated wastes, and contaminated soils were removed from the Clayton Chemical property by December 1983.

In 1984, two soil samples were collected during a water line construction project in the lagoons. These samples were analyzed for PCBs, benzene, oil, and grease. Due to heavy subsurface contamination, the water line was laid above the ground (1).

In February 1987, 11 subsurface soil samples were collected by Ecology and Environment from Site O and Landfill S. Nine subsurface samples were collected from the lagoons and two subsurface soil samples were collected near the lagoons. Background samples were collected east of SWWTP on Site O and from the southeastern portion of Landfill S. Monitoring wells were installed at five of the 11 subsurface soil sample locations, three in the lagoons, one east of the old wastewater treatment plant, and one on the southeastern portion of Landfill S. Groundwater samples were collected in February and July 1987. Figure 2 shows the location of the subsurface soil and well sample locations.

Illinois EPA collected a subsurface soil sample and two groundwater samples at Site O in May 1999 (3). These samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, and inorganic compounds.

### **Environmental Sampling at Landfill S**

Three sampling events have taken place at Landfill S. The first samples were part of the remedial investigation conducted by Ecology and Environment and consisted of one subsurface soil sample and two well water samples collected in 1987. In March 1994, Illinois EPA collected three surface soil samples and two subsurface soil samples (4). One surface sample was collected near a surface leachate seep. The most recent sampling was also performed by Illinois EPA in May 1999 and included one subsurface soil sample and two well samples. These samples were analyzed for volatile and semi-volatile organic compounds, pesticides, PCBs, inorganic compounds, dioxins, and furans (3). The locations of the samples are shown in Figure 1.

### **Site Visit**

IDPH has made several site visits, with the most recent on April 30, 2002. The site conditions were the same as on previous visits. The area is industrial, with Mobile Avenue the only road leading to the sites. SWWTP is fenced and the rock piles covering dioxin-contaminated soil are located north of Mobile Avenue. The closed SWWTP lagoons are fenced except where Mobile Avenue runs through to the ABRWWT plant. The northern portion of Landfill S is fenced and the western section, where the chlorinated solvents are coming to the surface, is also fenced and covered with gravel.

## Discussion

### Chemicals of Interest

IDPH compared the results of each soil and groundwater sample with appropriate screening comparison values used to select chemicals for further evaluation for carcinogenic and noncarcinogenic health effects. Chemicals found at levels greater than comparison values or those for which no comparison values exist were selected for further evaluation. Table 1 shows the chemicals of interest for groundwater and Table 2 shows the chemicals of interest in soil. An explanation of each comparison value used is found in Attachment 1.

The chemicals of interest in soil were found in both surface and subsurface soil. Waste was leaching to the surface at landfill S and this is the most likely location for chemical contact. The chemicals of interest in surface soils at Landfill S are 1,1-dichloroethane, 1,1,1-trichloroethane, vinyl chloride, and mercury.

### Exposure Analysis

Exposure to a chemical at a level that exceeds a comparison value does not necessarily mean that adverse health effects will result. The potential for exposed persons to experience adverse health effects depends on:

- ▶ how much of each chemical a person is exposed to,
- ▶ how long a person is exposed,
- ▶ the health condition of the exposed person.

People can be affected by a chemical only if they contact it through an exposure pathway at a sufficient concentration to cause a toxic effect. This requires a source of exposure, an environmental transport medium, a point of exposure, a route of exposure, and a receptor population. A pathway is complete if all of its components are present and if people were exposed in the past, are currently exposed, or will be exposed in the future. If parts of a pathway are absent, data are insufficient to decide whether it is complete, or exposure might occur at some time (past, present, future), then it is a potential pathway. If part of a pathway is not present and will never exist, the pathway is incomplete and can be eliminated from further consideration.

### Completed Exposure Pathways

A completed exposure pathway (Table 3) exists for contaminants in surface soil and surfacing wastes at Landfill S. The chemicals of interest are 1,1-dichloroethane, 1,1,1-trichloroethane, vinyl chloride, and mercury. Exposure can occur by breathing contaminated air, coming into direct contact with the soil or waste, ingesting the chemicals, or absorbing them through the skin. Exposure would be low and infrequent and not be expected to cause adverse health effects.



The dioxin contamination located just south of SWWTP is covered with 1 to several feet of gravel and is fenced, so exposure is not expected to occur under these circumstances.

### **Potential Exposure Pathways**

Potential exposure pathways (Table 4) could occur during remediation or otherwise disturbing or contacting surface soil, subsurface soil, and groundwater. Workers remediating site-related contaminants should be wearing protective clothing.

The nearest downgradient drinking water well is more than 1 mile south of Site O and should not be affected by the site. No drinking water wells are in use near the facility. Extensive groundwater contamination exists, but no known contact with groundwater occurs near the site. Groundwater contaminants will not be considered further in this assessment.

### **Toxicological Evaluation**

No children are expected to be exposed to site-related chemicals either now or in the future. IDPH estimated exposures for adult workers at Landfill S and assumed that workers who were either mowing or applying herbicides on Landfill S would be the most highly exposed population. The length of exposure to the chemicals for these adults was estimated to be 1 day per week for 26 weeks.

The estimated exposure doses were compared with health guidelines for noncancer health effects. Cancer risks were estimated for those chemicals that are known or suspected carcinogens. From these estimates, IDPH found that no noncancer adverse health effects would be expected and no apparent increased cancer risk exists for exposure to on-site contamination.

## **Community Health Concerns**

No community health concerns were identified for Site O or Landfill S. Sauget and Cahokia residents have concerns about other areas in the Sauget Sites. These concerns have been addressed in previous health consultations or will be addressed in future health evaluations of these areas.

### **Child Health Initiative**

IDPH recognizes that children are especially sensitive to some contaminants. Children were not included in this assessment because it is an active industrial area and the areas of surface contamination are fenced. The nearest homes are more than 0.5 miles away and are east of Illinois Route 3, a four-lane highway.

### **Conclusions**

IDPH concludes that Site O and Landfill S, within Sauget Sites Area 2, in Sauget, Illinois, pose no apparent public health hazard for exposure to contaminated soil and groundwater. This conclusion is based on the fact that estimated exposure to the highest levels of contaminants detected during environmental sampling would not be expected to cause adverse health effects. Contamination exists in subsurface soil and in groundwater, but no one is exposed to these chemicals.

### **Recommendations**

IDPH recommends that workers at Landfill S avoid contact with waste at, or moving to, the surface.

### **Public Health Action Plan**

IDPH will contact the site operators and encourage them to notify workers of this recommendation.

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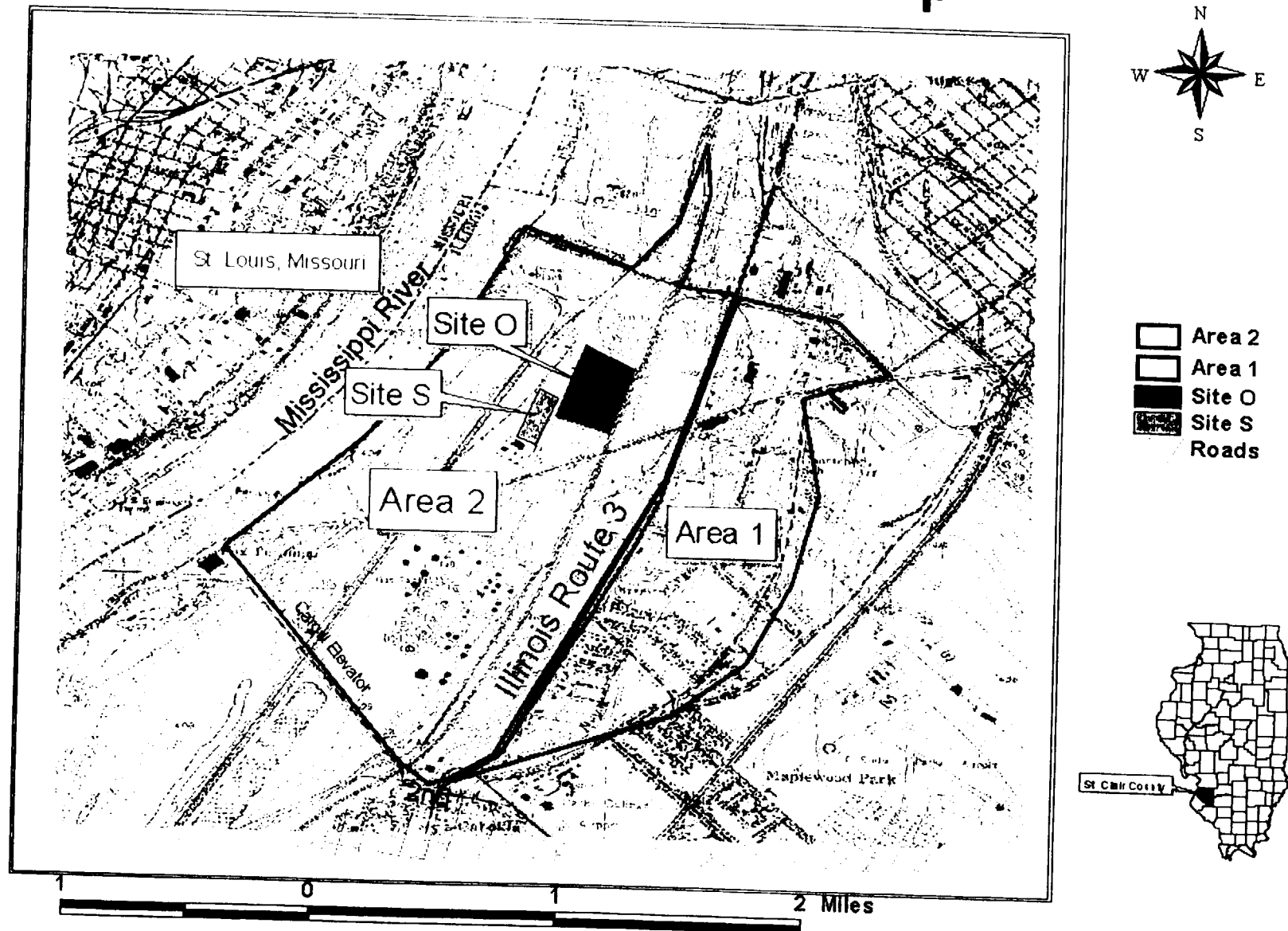
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### References

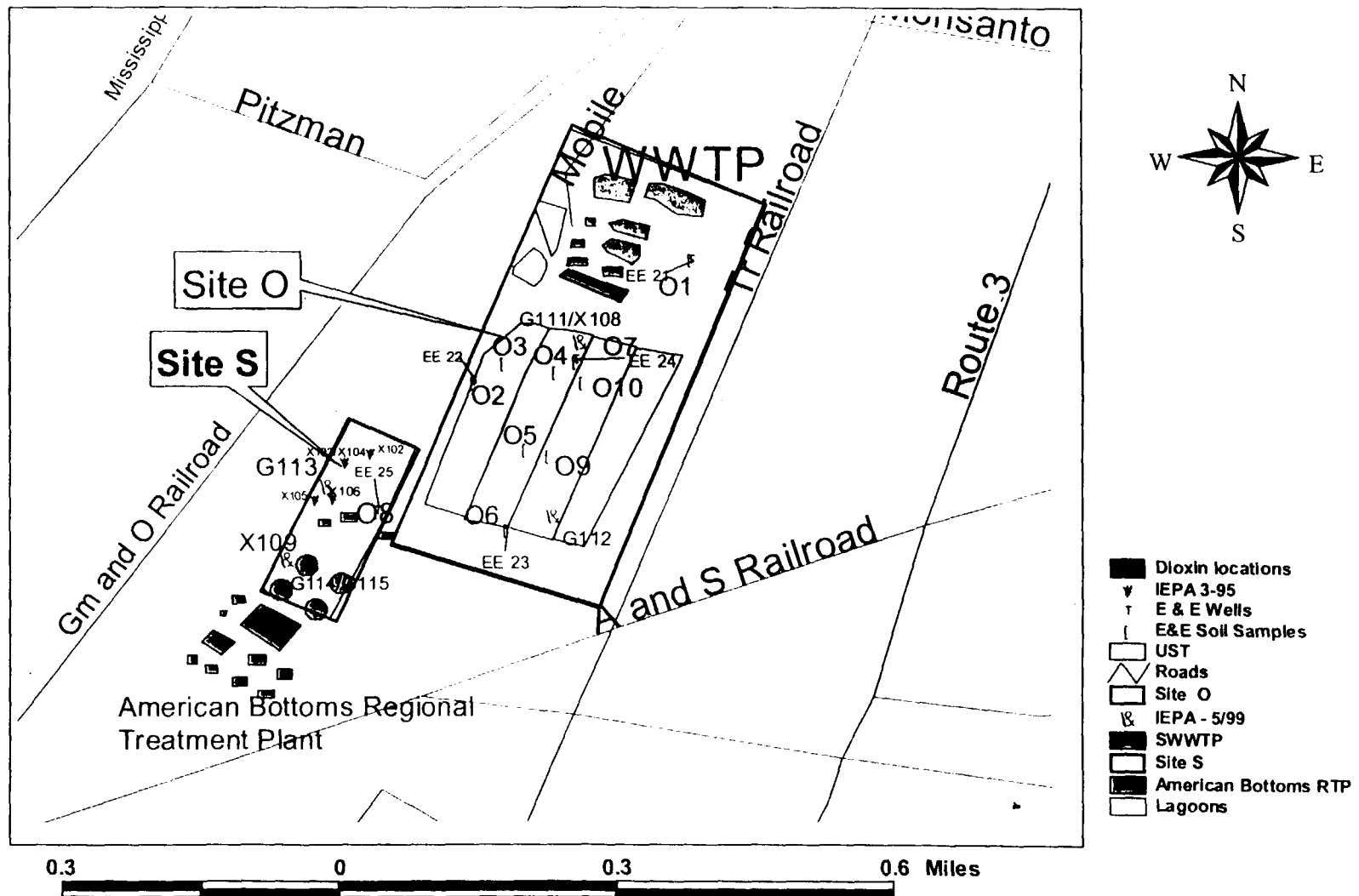
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2. Illinois Department of Public Health. Letter to David Webb from George Schillinger, plant manager, American Bottoms Regional Waste Water Treatment Plant. Springfield, Illinois. December 21, 2000.
3. Illinois Environmental Protection Agency. Data package for samples collected from Area 2. Springfield, Illinois. May 1999.
4. Illinois Environmental Protection Agency. Sauget Area 2—Site S sample results. Springfield, Illinois. March 1994.
5. Agency for Toxic Substances and Disease Registry. Public health assessment guidance manual. Atlanta: US Department of Health and Human Services; 1992.

## **Figures**

# Figure 1 - Site Location Map



**Figure 2 - Detailed Site Map with Sample Locations**



## **Tables**

**Table 1. Chemicals of Interest in Groundwater at Site O and Landfill S in parts per billion (ppb).**

Chemical	Maximum Level at Site O	Detections Out of 6 Samples	Maximum Level at Landfill S	Detections Out of 3 Samples	CV in (ppb)	CV Source
<b>Volatile Organic Compounds</b>						
Methylene Chloride	31,000	1	nd	0	5	C REG
1,1-Dichloroethane	1,700	1	4 J	1	NV	NV
1,1-Dichloroethene	nd	0	1 J	1	0.06	C REG
trans-1,2-Dichloroethene	14,000	1	nd	0	100	LTHA
Chloroform	1,800	1	nd	0	100/400	C EMEG
1,2-Dichloroethane	2,600	1	nd	0	0.4	C REG
2-Butanone	54,000	3	5 BJ	1	6,000/20,000	RMEG
1,1,1-Trichloroethane	5,000	2	3 J	1	200	LTHA
1,1,2,2-Tetrachloroethane	12,000	1	nd	0	1	C REG
Benzene	150,000	2	54	1	0.6	C REG
Toluene	1,300	2	18	1	200/700	I EMEG
Ethylbenzene	850	1	14	1	700	LTHA
Chlorobenzene	180,000	4	8 J	1	100	LTHA
<b>Semi-volatile Organic Compounds</b>						
1,4-Dichlorobenzene	15,000 E	2	nd	0	75	LTHA
1,2-Dichlorobenzene	11,000 E	2	11	1	600	LTHA
1,2,4-Trichlorobenzene	200	1	nd	0	70	LTHA
Naphthalene	100	1	550	1	20	LTHA
Pentachlorophenol	280	2	nd	0	0.3	C REG
<b>Pesticides/PCBs</b>						
Dieldrin	0.0076 JP	2	0.0066J	1	0.002	C REG
<b>Inorganic Compounds</b>						
Arsenic	123	4	124	1	3/10	C EMEG
Cadmium	11	1	nd	0	2/7	C EMEG
Cobalt	22.9 B	6	2.5 B	2	NV	NV
Lead	6,350	3	nd	0	NV	NV
Manganese	6,030	3	4,140	3	500/2000	RMEG
Vanadium	70	2	2.1 B	1	30/100	I EMEG

J = an estimated value

E = an estimated value on the high end of detection limit

P = indicates a pesticide/Arochlor analyte when there is greater than 25% difference for the detected concentrations between two columns.

B = the reported value is less than the CRDL but greater than the instrument detection limit.

nd = chemical not detected

NV = no comparison value

C EMEG = chronic environmental media evaluation guide

I EMEG = intermediate environmental media evaluation guide

RMEG = reference dose media evaluation guide

C REG = cancer risk media evaluation guide

LTHA = lifetime health advisory for drinking water



**Table 2. Soil Sample Analyses at Site O and Landfill S, Sauget Sites Area 2, in parts per million (ppm).**

Chemical	Subsurface Samples				Surface Samples					
	Maximum Level Detected at Site O	Detections Out of 14 Samples	Maximum Level Detected at Landfill S	Detections Out of 3 Samples	Maximum Level Detected at Landfill S	Detections Out of 3 Samples	Maximum Level Detected at Site O	Detections Out of 8 Samples	CV in ppm	CV Source
Volatile Organic Compounds										
1,1-Dichloroethane	0.01 J	1	-	-	6.5	1	NA	NA	NV	NV
1,1,1-Trichloroethane	12	2	0-0.004 J	1	12	2	NA	NA	NV	NV
Trichloroethylene	3.7	1	-	-	2.8	2	NA	NA	UR	CREG
Benzene	30.8	6	-	-	1.8	1	NA	NA	10	CREG
Vinyl Chloride	-	-	-	-	1.4	1	NA	NA	0.5	CREG
Semi-volatile Organic Compounds										
1,3-Dichlorobenzene	200	1	-	-	-	-	NA	NA	NV	NV
2,4-Dichlorophenol	250	2	-	-	-	-	NA	NA	200	RMEG
2,4,6-Trichlorophenol	130	1	-	-	-	-	NA	NA	60	CREG
2-Nitrophenol	120	1	-	-	-	-	NA	NA	NV	NV
Pentachlorophenol	1,300	9	-	-	-	-	NA	NA	6	CREG
Chrysene	870	6	-	-	-	-	NA	NA	NV	NV
Benzo(b)Fluoranthene	160	3	-	-	-	-	NA	NA	NV	NV
Benzo(a)Pyrene	160	3	-	-	-	-	NA	NA	0.1	CREG
Benzo(g,h,i)Perylene	52.5	2	-	-	-	-	NA	NA	NV	NV
Dibenz(a,h)anthracene	0-100 J	1	-	-	-	-	NA	NA	NV	NV

Chemical	Subsurface Samples				Surface Samples					
	Maximum Level Detected at Site O	Detections Out of 14 Samples	Maximum Level Detected at Landfill S	Detections Out of 3 Samples	Maximum Level Detected at Landfill S	Detections Out of 3 Samples	Maximum Level Detected at Site O	Detections Out of 8 Samples	CV in ppm	CV Source
Pesticides\PCBs\Dioxins										
Arochlor-1232	30.4	2	-	-	-	-	NA	NA	0.4	C REG
Arochlor-1242	2,900	7	-	-	-	-	NA	NA	0.4	C REG
Arochlor-1248	-	-	85	2	85	2	NA	NA	0.4	C REG
Arochlor-1254	930	3	69	3	69	2	NA	NA	1	C EMEG
Arochlor-1260	530	3	41	3	41	2	NA	NA	0.4	C REG
OCDD	-	-	2.9 J	1/1	-	-	NA	NA	NV	NV
PCBs Total	54	4/4	NA	NA	-	-	32	6/8	0.4	C REG
TCDD Total	0.013	4/16	NA	NA	-	-	0.077	6/17	NV	NV
Inorganic Compounds										
Arsenic	120 R	11	5	3	5.2	3	NA	NA	0.5	C REG
Cadmium	2,370	6	12	2	4.0	3	NA	NA	10	C EMEG
Cobalt	26	3	10.2	3	20.5	3	NA	NA	NV	NV
Lead	7,180	12	324	3	392	3	NA	NA	NV	NV
Mercury	1,564	6	0.36	3	3.5	3	NA	NA	NV	NV
Zinc	60,400	12	327	3	283	3	NA	NA	20,000	RMEG

J = an estimated value

ND = chemical not detected

NV = no comparison value

C EMEG = chronic environmental media evaluation guide

C REG = cancer risk media evaluation guide

UR = under review

NA = chemical not analyzed for in these samples

R = spike sample recovery not within control limits

RMEG = reference dose media evaluation guide

**Table 3. Completed exposure pathways**

<b>Pathway Name</b>	<b>Source</b>	<b>Medium</b>	<b>Exposure Point</b>	<b>Exposure Route</b>	<b>Receptor Population</b>	<b>Time of Exposure</b>	<b>Exposure Activities</b>	<b>Estimated Number Exposed</b>	<b>Chemicals</b>
On-site surface soil	On-site soil Surfacing waste	Surface soil	Surface of Landfill S	Ingestion Inhalation Dermal	Employees and workers at or near Landfill S	Past Present Future	Contacting contaminated soil	70	Table 2
Ambient air	Surfacing waste	Air	Surface of Landfill S	Inhalation	Employees and workers at or near Landfill S	Past Present Future	Breathing	70	Table 2
Surfacing waste	Surfacing waste	Waste	Surface of Landfill S	Ingestion Inhalation Dermal	Employees and workers at or near Landfill S	Past Present Future	Contacting contaminated waste	70	Table 2

**Table 4. Potential exposure pathways**

Pathway Name	Source	Medium	Exposure Point	Exposure Route	Receptor Population	Time of Exposure	Exposure Activities	Estimated Potential Number Exposed	Chemicals
Covered contaminated soil at Site O	Dioxin and PCB contaminated soil at Site O	On-site soil	Site O	Ingestion Inhalation	Remedial workers  Soil samplers	Future	Soil excavation or removal.	150	Table 2
Subsurface contamination	Contaminated soil  Contaminated groundwater	Subsurface soil  Groundwater	Site O & Landfill S	Ingestion Inhalation Dermal	Remedial workers	Future	Subsurface soil and waste excavation or removal  Groundwater monitoring or remediation	150	Tables 1 and 2
Surface waste and contaminated surface soil	Waste  Surface soil	On-site soil  Waste	Landfill S	Ingestion Inhalation Dermal	Remedial workers	Future	Soil excavation or removal	150	Table 2

## Attachment 1

**Comparison Values Used in Screening Contaminants for Further Evaluation**

Environmental media evaluation guides (EMEGs) are developed for chemicals on the basis of their toxicity, frequency of occurrence at National Priorities List (NPL) sites, and potential for human exposure. They are derived to protect the most sensitive populations and are not action levels, but rather are comparison values. They do not consider carcinogenic effects, chemical interactions, multiple route exposure, or other media-specific routes of exposure, and are very conservative concentration values designed to protect sensitive members of the population.

Reference dose media evaluation guides (RMEGs) are another type of comparison value derived to protect the most sensitive populations. They do not consider carcinogenic effects, chemical interactions, multiple route exposure, or other media-specific routes of exposure, and are very conservative concentration values designed to protect sensitive members of the population.

Cancer risk evaluation guides (CREGs) are estimated contaminant concentrations on the basis of a probability of 1 excess cancer in 1 million persons exposed to a chemical over a lifetime. These are also very conservative values designed to protect sensitive members of the population.

Maximum contaminant levels (MCLs) have been established by the U.S. Environmental Protection Agency for public water supplies to reduce the chances of adverse health effects from contaminated drinking water. These standards are well below levels for which health effects have been observed and take into account the financial feasibility of achieving specific contaminant levels. These are enforceable limits that public water supplies must meet.

Lifetime health advisories for drinking water (LTHAs) have been established by USEPA for drinking water and are the concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects over a lifetime of exposure. These are conservative values that incorporate a margin of safety.